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POST-RETIREMENT BENEFIT INCREASES IN STATE PENSION PLANS: THE RESPONSE TO INFLATION IN THE 1970s*

John Strate**

April 1982

Working Paper #3
of the
National Aging Policy Center
on Income Maintenance

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The Florence Heller Graduate School
Brandeis University
Waltham, Massachusetts 02254

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ABSTRACT

This study looks at cost of living adjustments in state pension plans and the impact of such adjustments during the 1970s on the purchasing power of pension benefits. The study includes state pension plans of three types: plans that include teachers only, plans that include general employees but exclude teachers, and plans that include both general employees and teachers. As of 1980, there were 76 of these plans in the United States, with a total active membership of 7.8 million (about seven-eighths of the active membership in all state government administered plans).

We found that nearly all state pension plans increased benefits for retirees during the 1970s. The methods used to increase benefits varied greatly from plan to plan. Overall, however, increases were much less than those needed to maintain the purchasing power of pension benefits at the date of retirement. As a consequence, the standard of living of retirees in these plans declined substantially during the 1970s.

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POST-RETIREMENT BENEFIT INCREASES IN STATE PENSION PLANS: THE RESPONSE TO INFLATION IN THE 1970s

Introduction

This study investigates cost of living adjustments in public pension plans that are administered by state governments. Such adjustments are important to retirees because they help maintain the original purchasing power of retirement benefits during inflationary periods. These adjustments, therefore, were particularly important during the 1970s, a period of high inflation that saw prices as measured by the Consumer Price Index (CPI) increase by 104 percent.

We investigate cost of living adjustments in three types of plans at the state level: plans that include teachers only, plans that include general employees but exclude teachers, and plans that include general employees and teachers. These plans are generally the largest public pension plans that are administered by state governments. In 1980 these plans had a total of 7.8 million active members and a total of 1.8 million retirees. The active members in these plans comprise about seven-eighths of the total active membership in public pension plans that are administered by state governments.

Other types of plans at the state level are generally smaller. Among these are plans for the employees of local governments, plans for the faculty and employees of public colleges and universities, and plans for special categories of employees such as policemen, firemen, legislators, judges,

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correctional officers, elected officials, and conservation officers. The active members in these plans comprise only about one-eighth of the total active membership in public pension plans that are administered by state governments.

An overall picture of the importance of public pension plans at the state level is provided by the survey of public employee retirement systems conducted in 1975 by the House Pension Task Force.* At the state level the survey identified 554 plans with a total active membership of 8.6 million. At the local level the survey identified 5,234 plans with a total active membership of 1.6 million. Overall, at both levels of government, there was a total of 5,788 plans with a total active membership of 10.2 million. Although there were fewer plans at the state than at the local level, the total active membership of these plans was much larger.

The potentially devastating impact of inflation during the 1970s on pension benefits is perhaps best gauged by looking at the purchasing power of such benefits at the end of the decade under the assumption that there were no cost of living adjustments. A public employee who retired in December of 1969 and received a pension benefit equal to $100 per month would have seen the purchasing power of that benefit (in December 1969 dollars) reduced to $49.09 by December of 1979. A public employee who retired in December of 1974 and received a pension benefit equal to $100 per

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*See Committee on Education and Labor (1978).

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month would have seen the purchasing power of that benefit (in December 1974 dollars) reduced to $67.57 by December of 1979.* These were declines of 51 percent and 32 percent respectively in the original purchasing power of pension benefits.

The purpose of cost of living adjustments is to ameliorate declines in the purchasing power of pension benefits that occur because of inflation. In the most general sense there are two types of cost of living adjustments: automatic adjustments and ad hoc adjustments. Automatic adjustments occur regularly, such as every year, apply uniformly to all retirees, and do not change arbitrarily. Examples of automatic adjustments include the full indexing of pensions to a price index, the indexing of pensions to a price index with a cap that limits the maximum adjustment possible, the indexing of pensions to wage increases, or the periodic adjustment of pensions by a fixed percentage. Ad hoc adjustments do not have one or more of the features of automatic adjustments. They do not occur regularly, or do not apply uniformly to all

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*There is widespread agreement among economists that the Consumer Price Index (CPI) as it is presently constructed tends to overestimate inflation (see Gordon, 1981). The major deficiencies of the CPI include the treatment of the costs of home ownership on the basis of current mortgage interest rates, failure to include new products in the index expeditiously, the inappropriate weighting of some items in the index, and the failure to account adequately for improvements in product quality.

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retirees, or change arbitrarily. Examples of ad hoc adjustments include scheduled percentage increases based on the date of retirement and dollar increases equal to a dollar amount times the number of years of service.

Although there has been some research on cost of living adjustments in public pension plans that are administered by state and local governments, such research is now either out of date or is too limited in scope to accurately determine the effects of such adjustments on pension benefits. The major objective of this study was to collect data on cost of living adjustments that are as up-to-date as possible and that are sufficiently detailed so that the effects of such adjustments on pensions can be determined.

Prior Research

The first comprehensive study of cost of living adjustments in public pension plans was conducted by John Mackin (1971). The principal focus of his study was cost of living adjustments in state plans during the 1960s, although he also looked at adjustments in federal employee retirement systems and in several local governmental systems. In regard to state retirement systems, Mackin found that the 1960s was a period of rapid growth in cost of living adjustments. During the 1960s, 25 state pension plans established automatic or systematic methods of adjusting pensions after retirement. All but nine of 25 systems without automatic adjustment

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provisions increased benefits by legislative action. Mackin identified three basic types of adjustments in state plans: ad hoc increases, increases contingent on favorable actuarial experience, and automatic increases. His study provides valuable information on the specific methods that state plans used to adjust pensions during the 1960s, as well as valuable information on different methods used to finance cost of living adjustments.

The results of an excellent and pathbreaking study of public pension plans were published by Robert Tilove in 1976. The study was based on a 1972 survey of 179 of the largest state and local retirement systems. The data for Tilove's study, therefore, are now about a decade old.

Tilove focused on "automatic" cost of living adjustments. According to his definition, automatic adjustments include adjustments corresponding to changes in the CPI, adjustments that are annual fixed percentage increases, and adjustments that are based on the pay of active workers, the earnings of pension plan assets, or other criteria. Tilove did not look at ad hoc cost of living adjustments, such as one time adjustments or adjustments that require annual legislative action.

Tilove found that 59 of the 179 surveyed state and local retirement systems had automatic cost of living adjustments. Automatic adjustments covered about one-half of all state and local employees. Twenty-five state and local retirement systems indexed pensions to the CPI with a cap, 16 systems

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adjusted pensions periodically by a fixed percentage, one system based adjustments on salary changes, and 17 other systems used other types of adjustments.

A later study by the Pension Task Force (1978), based on a 1975 survey of federal, state, and local pension plans, found that 43 percent of state and local government pension plans had cost of living adjustments. The employees within these plans, however, comprised 96 percent of all employees of state and local governments. The most common types of adjustments were automatic adjustments using a cap or fixed percentage increase (13 percent of plans, 46 percent of employees), and adjustments based on the investment performance of the pension plan portfolio or some other basis (12 percent of plans, 13 percent of employees). A less common type of adjustment was an automatic adjustment without a cap (10 percent of plans, 5 percent of employees).

In 1978 a major book on cost of living adjustments -- Indexation of Pension and Other Benefits -- was published. The book was written by Robert Myers, who was chief actuary of the Social Security Administration from 1947 to 1970. This book gives limited attention to state and local plans -- focusing mainly on cost of living adjustments in federal pension programs: the social security program, federal civil service, and the military retirement program. These retirement systems, unlike nearly every state and local retirement system,

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automatically adjust pensions fully for increases in the cost of living. For this reason, cost of living adjustments in these programs do a better job of maintaining the original purchasing power of retirement benefits than cost of living adjustments in nearly every other public and private retirement system. Although the cost of living adjustment provisions of these programs have sometimes been suggested as models for other retirement systems (Benedict, 1979-80), adjusting pensions fully for changes in the cost of living is very costly, raising questions about the long term financial viability of systems with such provisions (Aspen Institute, 1979; Munnell, 1979; Munnell and Connolly, 1980).

A recent study by Winklevoss and McGill (1979) used data on 20 public plans at the state and local level to provide an overview of important issues in plan design, plan funding, and financial disclosure. The authors point out the advantages and disadvantages associated with different methods of protecting the purchasing power of pension benefits, both before and after retirement. They show that basing pension benefits on final average salary formulas is a simple and fairly effective method of adjusting the value of benefits at retirement. They conclude that methods of adjusting pensions using the CPI are generally better than other methods, because changes in pension benefits are directly related to changes in the cost of living.

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Another study by Schulz et al. (1980) uses data from the Current Population Survey in a simulation model to estimate the eligibility for and size of pension benefits of individuals in state and local government. Schulz's calculations, based on data from the Pension Task Force, indicated that cost of living adjustments are more common in public pension programs whose participants are not covered by social security. Among different types of plans, cost of living adjustments are more common in general employee plans than in police and fire plans and teacher plans.

The most recent study of cost of living adjustments is that published by The Urban Institute (1981). It is based on a sample of 112 state and local pension plans (88 simple plans and 12 plans with an additional tier). The study found that 41 of the 112 plans adjusted benefits by using a price index or some other method that takes inflation into account. The most common type of adjustment was indexing to the CPI with a cap of either two or three percent. The study also found that many plans used ad hoc adjustments either as a substitute for indexing to the CPI or as a supplement to this method. According to The Urban Institute's estimate, ad hoc adjustments granted over the period 1974 to 1979 resulted in about a 1.5 percent average annual increase in the benefits of all retirees.

Methods of adjusting pensions in state and local plans, especially ad hoc adjustments, are often far more complicated

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than is evident from capsule summaries of plan adjustment provisions. For this reason it is sometimes difficult to determine the increases in pension benefits that actually result from cost of living adjustments. To do this it is necessary, for most state and local plans, to look at actual adjustments for specific groups of retirees, rather than just plan provisions for adjustments. This permits one to more effectively determine the impact of any restrictions that apply to adjustments and to make appropriate assumptions about the retirees (e.g., retirement date, years of service, or salary history) affected by such adjustments.

Methodology

The scope of this study includes 76 pension plans at the state level. As indicated above, we selected plans of three types: plans that include teachers only, plans that include general employees but exclude teachers, and plans that include both general employees and teachers. We identified most of these 76 plans from listings contained in Teacher Retirement Systems (1976) and Survey of State Retirement Systems (1980). We included plans of these types from all 50 states.

Twenty-five of the plans include teachers only. In 1980 the total active membership of these 25 plans was 2.7 million, and the total number of retirees was 584 thousand. Twenty-six of these plans include general employees but exclude teachers. The total active membership of these 26 plans was 2.5 million,

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and the total number of retirees was 686 thousand. Twenty-five of these plans include both general employees and teachers. The total active membership of these 25 plans was 2.7 million, and the total number of retirees was 545 thousand.

To gather information, we developed a telephone interview instrument. The first part of this instrument dealt with the type, nature, and extent of cost of living adjustments for each plan over the period 1975 to 1980 (see Appendix 6). Subsequent parts of the instrument dealt with special restrictions on cost of living adjustments -- such as waiting periods, maximum adjustments, and age restrictions. Another part dealt with the number of active members and retirees in plans. For each plan, we also recorded the normal retirement benefit formula(s) and any changes in those formula(s) during the relevant period.

We conducted initial telephone interviews with plan administrators or, in several cases, with assistant plan administrators, actuaries, or other individuals with special knowledge about cost of living adjustments. We conducted interviews with all 76 plans for a response rate of 100 percent. Some of the plans contacted sent us plan documents or put the information that we requested in writing and mailed it to us. For most of the plans we also conducted a second follow-up telephone interview. The purpose of this second interview was to check for the accuracy of some of the information obtained in the initial interview, to fill in

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any gaps in information from the initial interview, and to obtain additional information on cost of living adjustments for the period 1970 through 1974 (this period having been originally excluded from the scope of the study).

The information that we collected allows us to assess the extent to which cost of living adjustments in state pension plans have had a significant moderating impact on the decline in the real value of pension benefits from inflation. We are able to do this for each of the survey plans for the period 1970 through 1980.

Our method is to look at the impact of these adjustments in each plan on hypothetical retirees with specific retirement dates, years of service, and salary histories. We use this method because of the difficulty and expense of conducting interviews with actual retirees in each plan.

We look at two types of hypothetical retirees: individuals who retired in June 1969 at age 65 (or the plan's normal retirement age, if younger) with 30 years of service, and individuals who retired in June 1974 at age 65 (or the plan's normal retirement age, if younger) with 30 years of service. We decided to look at retirees with different retirement dates when it became apparent in the initial interview that the size of cost of living adjustments in many state plans varied greatly, depending on the individual's date of retirement. We decided to select June as the month of retirement because many public employees, particularly teachers, choose a summer

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month in which to retire. It should also be noted that the effective date of cost of living adjustments in many state pension plans is July 1. Since many state pension plans do not pay cost of living adjustments to individuals retired for less than one year, those individuals who retire in July or in a later month must often wait for a longer time to receive their first cost of living adjustment than individuals who retire in the first half of a year. We looked at hypothetical retirees with 30 years service because we felt that the impact of cost of living adjustments in plans of different types is best assessed by determining the effects of such adjustments on the pension benefits of retirees who were career employees. In most state plans employees with thirty years of service qualify for the maximum benefits allowed under the normal service retirement benefit formula.

After the information was gathered and tabulated we calculated pension benefits for these two types of retirees at the date of retirement by using the appropriate plan formulas for calculating normal service retirement benefits (assuming that options such as a joint and survivor annuity were not selected). All but a few of the 76 plans are defined benefit plans that calculate retirement benefits using "final average salaries." The final average salaries in these plans are typically an average of the highest salaries in either three or five of any ten continuous years of employment. To obtain final average salaries, therefore, we needed to estimate

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salary histories for 1969 and 1974 retirees in plans of different types using salary data that were state specific. We estimated salary histories for teachers by using salary data published by the National Education Association (1981; and earlier years), and we estimated salary histories for general employees by using information from the Census of Governments, 1972 (1974). Appendix 2 details the methods used in making these estimates.

Our second step was to use information on cost of living adjustments in the 76 plans to calculate changes in the pension benefits of retirees at later dates. For 1969 retirees, we looked at pension benefits in 1974 and 1980. For 1974 retirees, we looked at pension benefits in 1980. The pension benefits that we calculated reflect the "yearly pension benefit" that would be obtained after adding in cost of living adjustments in previous years and the current calendar year. It is important to note that this pension benefit reflects the highest yearly rate of payment in a particular year (generally calculated by multiplying the largest monthly payment in a particular year by 12). It is not identical to the sum of the monthly pension benefits received in a year.

For several reasons, we found that the latter measure was too difficult to calculate. For some plans we were unable to obtain information on the month that a cost of living adjustment became effective. For this reason we could not calculate the total dollar amount of the pension benefits in a particular year because we could not determine the

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number of monthly checks in the year that included the cost of living adjustment. While the yearly pension benefit is not identical to the total dollar amount of pension benefits, it is usually quite close. Typically, it is somewhat larger than the total dollar amount, since it is a per year rate based on the largest monthly payment occuring during a calendar year. Since it reflects a rate of payment rather than an actual dollar amount, we feel it may actually be a better measure by which to compare plans, since small differences between plans in the months during which cost of living adjustments become effective are ignored.

Our third step was to use these calculated yearly pension benefits to figure percentage changes in pension benefits over different periods. For several reasons, we decided to focus on percentage changes in pension benefits over the period 1974 to 1980. One reason is that inflation was more severe in the second half of the decade of the 1970s. Another reason is that we wanted to compare pension benefits for 1969 retirees with increases for 1974 retirees over the same time period to determine whether benefit increases were greater for 1969 retirees, and if they were, by how much.

Our fourth step was to calculate replacement rates at the date of retirement and in 1980 (in constant retirement date dollars). Replacement rates are the proportion of preretirement earnings replaced by pensions. They serve as a measure of the extent to which retirees are able to maintain the standard of living that they enjoyed before retirement.

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In several tables we present results using both pension plans and retirees as the unit of analysis. Although the data that we have are for plans, and not for retirees, we can "look" at retirees by weighting the plan data by the number of retirees in each plan. In doing this, large plans have greater weight in calculations than small plans, giving a different perspective on how retirees were affected by cost of living adjustments than by looking at plans only.

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Variations In Cost of Living Adjustments

There is great variety in the cost of living adjustments of public pension plans that are administered by state governments. Simple classification of such adjustments based on only a single criterion can be very misleading. To understand the nature of such adjustments more fully requires classification using a number of criteria.

One basis of classification is the type of adjustment--whether it is automatic or ad hoc. An adjustment that is automatic moves, operates, or regulates itself, occurs regularly (such as every year), applies uniformly to all retirees, and does not change arbitrarily. An adjustment that is ad hoc lacks one or more of the features of automatic adjustments. It may require intervention (such as special legislative action), it may occur only once or irregularly, it may not apply uniformly to all retirees, or it may be different in content and purpose from previous adjustments.

In some cases these criteria do not always provide a clearcut way of determining whether an adjustment is automatic or ad hoc. For example, in some plans adjustments have all of the features of automatic adjustments except that they require annual legislative action. In other plans adjustments occur regularly, as in automatic adjustments, but depend on the performance of plan investments, the results of an actuarial assessment of the pension plan, or the recommendations of a pension commission or some other group. Adjustments such as these are clearly "hybrids" in the sense that they combine

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features of both automatic and ad hoc adjustments. While such adjustments could be called "semi-automatic," we decided to assign them to the particular category, whether automatic or ad hoc, that they resembled most.

In most discussions of cost of living adjustments it is commonly assumed that automatic adjustments provide retirees with better protection against inflation than ad hoc adjustments. The reasons for this are that automatic adjustments occur regularly, are often tied to actual cost of living increases as measured by indices such as the CPI, are insulated from the ups and downs of state economies, and are less susceptible to manipulation by state legislatures. However, most state administered plans that have automatic adjustments also either place a cap on adjustments or limit adjustments to a fixed percentage. As a consequence, automatic adjustments in periods of high inflation do not necessarily provide better protection from inflation than ad hoc adjustments.

A second basis of classification is the method that is used to adjust pension benefits. The method refers to the precise way in which the pension is adjusted: whether by a percentage or by a dollar amount; whether by a schedule based on the date of retirement or years of service; whether applied to the current or the base pension amount, and so forth. Our analysis of cost of living adjustments in these plans detected no less than 29 distinctive methods of adjustment. This is testimony to the variety and flexibility (or negatively, to

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the lack of uniformity) possible in a federal system of 50 states. Likely reasons for this variety include variations in the fiscal condition of the states, the actuarial condition of plans, and the political influence of active and retired public employees and their lobbies. But, in addition, differences probably arise from the ingenuity of actuaries, plan administrators, pension commissions, public employee lobbies, bureaucrats, legislators, and other individuals with a direct hand in formulating cost of living legislation. In order to simplify the presentation of the variety of methods, we have collapsed the 29 methods into nine categories -- eight major categories that include the most frequently used methods of adjustment and a residual category that includes less frequently used methods of adjustment.

Table 1 shows the frequency of various types and methods of adjustments used by the 76 pension plans over the 1975 to 1980 period. The table shows that automatic adjustments (59 percent) were more common during this period than ad hoc adjustments (41 percent). The most common method of adjustment (40 percent of all adjustments) was a percentage adjustment of the pension benefit with a waiting period of one year or less after retirement. The second most common method of adjustment (16 percent of all adjustments) was a percentage adjustment of the pension benefit with a waiting period of more than one year after retirement. The third most common method of adjustment (11 percent of all adjustments) was a

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TABLE 1

TYPES AND METHODS OF COST OF LIVING ADJUSTMENTS IN STATE PENSION PLANS, 1975-1980

Method of Adjustment	Type of Adjustment (percentage)		
	Automatic	Ad Hoc	Total
Percent adjustment, waiting period one year or less	61	9	40
Percent adjustment, waiting period more than one year	23	6	16
Scheduled percent if retired by a given set of dates	-[a]	27	11
Percent adjustment on a portion of the retirement benefit	3	9	5
Dollar amount for each year of service	0	12	5
Percent adjustment with other restrictions (e.g., minimum or maximum adjustment)	5	4	5
Percent for each year of service	2	4	3
Retroactive formula change	0	7	3
Other	6	23	13
Total[b]	100	100	100
N	(238)	(163)	(401)
Column percent	59	41	

[a] Less than 0.5 percent.

[b] May not sum to 100 due to rounding.

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scheduled percentage adjustment based on the date of retirement. In this method of adjustment larger percentage increases are typically given to those who have been retired for a longer period of time. Other methods of adjustment that are listed in the table were much less common than these three. While most automatic adjustments are percentage adjustments with waiting periods, the methods used in ad hoc adjustments are much more variable.

The various methods that are used to adjust benefits suggest that a major purpose of many of these methods is to target cost of living adjustments so that the largest amounts are received by individuals who have been retired the longest. The rationale for this is presumably that those who have been retired the longest are most in need of cost of living adjustments. This is undoubtedly true to the extent that cost of living adjustments for those who have been retired the longest have fallen behind inflation and to the extent that their initial pensions were less than those of individuals who have just retired because they were calculated on lower earnings.

1. Caps and Fixed Percentage Increases

"Caps" are an important feature of cost of living adjustments in many public pension plans that adjust benefits automatically. A cap is a ceiling percentage that limits the maximum adjustment that is possible in plans that base adjustments on changes in the CPI or some other price or

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wage index. A cap limits the size of cost of living adjustments whenever the percentage change in the index exceeds the cap. Caps limit the size of cost of living adjustments during periods of high inflation. This is important to pension plan administration since it eliminates the danger that cost of living adjustments will result in runaway costs during periods of high inflation.

Table 2 presents the results of our analysis of caps in the 41 plans that used automatic adjustments. It shows that 31 of these plans used caps. The most common cap was three percent. Only two plans with cost of living adjustments tied to changes in the CPI did not have caps. One of these plans, the Maryland State Retirement System, based adjustments on changes in the average CPI (All Urban Consumers/ U.S. City Average) between the year of retirement and the current year.* The other plan, the New Jersey Public Employees Retirement System, adjusted pensions for 60 percent of the change in the CPI from the date of retirement, but with a waiting period of 24 months.

These findings regarding caps are similar to those reported by The Urban Institute (1981). Their larger sample of plans, unlike our study, included all types of plans at the state and local levels. They too found that nearly all plans with automatic inflation adjustments also had caps.

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*On January 1, 1980 the State of Maryland established a new retirement system for teachers and employees hired on or after that date. The new system has a cap of three percent on cost of living adjustments.

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TABLE 2

METHODS OF ADJUSTMENT IN
PLANS USING AUTOMATIC ADJUSTMENTS, 1980

Method of Adjustment		Number of Plans	Number of Retirees
Adjustment Tied to CPI			
With Cap of:	2.0%	6	269,000
	2.5	1	20,000
	3.0	9	248,000
	4.0	8	107,000
	5.0	4	29,000
	8.33	1	29,000
	10.0	1	15,000
	Other[a]	1	40,000
Without Cap		2[b]	81,000
Subtotal		33	837,000[d]
Adjustment Not Tied to CPI			
Fixed Percentage Increase of:	1.0%	1	13,000
	3.0	6	146,000
Other		1[c]	16,000
Subtotal		8	174,000[d]
Total		41	1,011,000[d]

[a]A variable cap that depends on an actuarial evaluation.

[b]Includes one plan in which adjustment is on only a portion of the change in the CPI.

[c]An "automatic" adjustment that is funded by the legislature and approved by the governor.

[d]May not add to total due to rounding.

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"Fixed percentage increases" were somewhat less common than caps in the plans we surveyed. A fixed percentage increase, as the phrase implies, is an adjustment that is determined by multiplying the pension benefit by a constant percentage, without consideration of changes in the CPI or some other index. Such adjustments occur on a regular basis (usually annually). One purpose of fixed percentage increases is to provide retirees with a stream of benefit increases during retirement that is predictable, since adjustments are not tied to rates of inflation (which fluctuate over time). A pension plan that uses fixed percentage increases will also be able to predict the costs of adjustments more accurately than a plan that uses caps. This usually makes financing the costs of adjustments somewhat easier.

Table 2 presents the results of our analysis of fixed percentage increases in the 41 plans that used automatic adjustments. It shows that seven plans used fixed percentage increases. Of these seven plans, six plans used three percent as the fixed percentage specified in the plan.

2. Compounding

In plans that increase benefits there are two ways of calculating adjustments: by compounding or not compounding. In pension plans that increase benefits by using percentage adjustments, such adjustments are compounded when a percentage is multiplied by the current benefit and the amount added to

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the current benefit. Adjustments are not compounded when a percentage is multiplied by the original base benefit and the amount added to the current benefit. In pension plans that increase benefits by using dollar adjustments, adjustments are compounded when the dollar amount is calculated in a formula that uses the current rather than the base benefit. Adjustments are not compounded when they are not calculated in this way or are paid out as a lump-sum, one-time "bonus" payment.

Of the plans studied, 68 percent calculated adjustments by compounding; 32 percent did not.* The difference between these two methods of adjustment, however, is large only after a substantial number of adjustments. A three percent annual adjustment that is compounded results, after five adjustments, in a 15.9 percent increase in pension benefits, versus a 15.0 percent increase for an adjustment that is not compounded. But after 15 adjustments, compounding results in a 55.8 percent increase in pension benefits, versus a 45.0 percent increase for an adjustment that is not compounded. Thus, compounding is likely to make a significant difference in pension benefits for those who have spent many years in retirement, such as those who have chosen early retirement.

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*Five plans shifted to the compounding method during the period 1974 to 1980.

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3. Legislative Action

In most state pension plans (78 percent of the surveyed plans), cost of living adjustments require legislative action of some type or other to become or remain effective. As a consequence, in most states, the type, method, size, and timing of cost of living adjustments are dependent on the outcome of political processes.

Ad hoc adjustments, because of their nature, almost always require legislative action. Of 32 surveyed plans that used only ad hoc adjustments, 30 required legislative action of some type for the ad hoc adjustments to become or remain effective.

Some automatic adjustments also require legislative action to become or remain effective. Of 17 plans that used only automatic adjustments, 10 required legislative action of some type. Although we did not collect detailed information on this matter, it was apparent from our interviews that some automatic adjustments are subject to a periodic review process. Other types of automatic adjustments, which are based on the CPI or some other variable index, change over time and thus may need formal legislative approval of the specific amounts allowed under applicable legislation.

Another likely reason for legislative action (although we did not collect detailed information on this) is financing procedures. In some states cost of living adjustments are paid for out of state revenues. This method of financing necessarily requires legislative action through the budgetary

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process. In other states cost of living adjustments are paid for by the pension plan. This method of financing may also require legislative approval of the recommendations of plan administrators, actuaries, pension commissions, or other individuals (groups) with a direct hand in drafting cost of living legislation.

It is likely that legislative action on cost of living adjustments is politically more controversial in states that use ad hoc cost of living adjustments. With ad hoc adjustments lawmakers can take credit for legislation that increases pension benefits. With automatic adjustments, after the initial increase, they cannot.

All plans that are administered by state governments, of course, are ultimately subject to action by state legislatures, since it is these legislatures that change the pension law or related pension legislation. There is always the possibility, therefore, of annual or biennial legislative inspection and revision of cost of living adjustments. For this reason it is difficult to argue that cost of living adjustments in plans that are administered by state governments are in any sense "permanent." Adjustments that are supposedly automatic may quickly lose this status if plan investment income diminishes or if a state confronts serious fiscal problems.

4. Portfolio Performance

In some state pension plans, the receipt (or amount) of cost of living adjustments is contingent (dependent) on the

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earnings or financial condition of the pension plan. This feature is found almost exclusively in pension plans that use ad hoc adjustments. Of the surveyed plans that used ad hoc adjustments, 33 percent had this feature. The purpose of this feature is to insure that cost of living adjustments do not result in a deterioration of the actuarial condition of the pension plan.

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Increases in Pension Benefits, 1974-1980

Over the period 1974 to 1980 a total of 73 out of the 76 plans that we surveyed gave cost of living adjustments. In many of these 73 plans, these cost of living adjustments resulted in large increases in "nominal" pension benefits. To illustrate this we can look at changes in the average size of pension benefits for 1969 and 1974 retirees over this period. For 1969 retirees, the median* pension benefit in 1974 was $5,293; in 1980 it was $6,714. For 1974 retirees, the median pension benefit in 1974 was $7,261; in 1980 it was $8,382. In terms of percentages, the median increase in pension plan benefits for 1969 retirees over this period was 25 percent; the median for 1974 retirees was 19 percent. Percentage increases of 25 and 19 percent, however, would not be enough to sustain the original purchasing power of pension benefits. During the same period, the increase in the Consumer Price Index was 68 percent.

While the inflation adjustments were substantially less than the CPI during this period, they were probably larger than those adjustments made by private plans over the same period. A survey by Bankers Trust Company (1980) of private plans looked at percentage increases in pension benefits over the period 1975 to 1979 (five years, rather than the six years

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*Weighted by the number of retirees in plan. Based on calculated benefits assuming 30 years of service and average earnings (see Appendix 3).

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of our study). In "pattern plans," the average percentage increase for those who retired January 1, 1970 was 17 percent; the average percentage increase for those who retired January 1, 1975 was 8 percent.* In conventional plans the average percentage increase for those who retired January 1, 1970 was 17 percent; the average percentage increase for those who retired January 1, 1975 was 9 percent. Percentage increases in private plans, therefore, were probably somewhat lower than those in the state plans that we surveyed.

Table 3 shows the percent of plans and the percent of retirees with various percentage increases in pension benefits from 1974 through 1980. Looking at the percent of plans, for 1969 retirees, most plans had adjustments in the range of 10 to 39 percent. For 1974 retirees, most plans had adjustments that were somewhat lower, in the range of 0 to 29 percent. Plan adjustments were lower for the 1974 retirees due to waiting periods and methods of adjusting pensions that resulted in disproportionately large increases for those retired the longest. Table 3 also shows that only a handful of plans (actually only two) adjusted fully for increases in the CPI and that there was great variation among plans in the size of percentage increases.

Looking at the percent of retirees, there is little indication that retirees obtaining small percentage increases

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*Figures are based only on plans that used percentage increases.

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TABLE 3

PERCENT OF PLANS (RETIREES) WITH VARIOUS PERCENTAGE INCREASES IN BENEFITS, 1974-1980

	1969 Retirees		1974 Retirees	
Percentage Increase	Percent of Plans	Percent of Retirees[a]	Percent of Plans	Percent of Retirees[a]
0-9	7	2	20	25
10-19	37	43	32	31
20-29	16	12	21	28
30-39	19	13	17	9
40-49	9	18	3	1
50-59	7	7	4	4
60-69	3	2	3	2
70+	3	2		
Total[b]	100	100	100	100
Total Plans[c]	75	75	75	75
Median or (Weighted Median) Percentage Increase	25	(27)	19	(19)

[a]The distributions for retirees are based on weighted plan data with weights set equal to the number of all retirees in each plan. While it would be more appropriate to set weights equal to the number of 1969 retirees or to the number of 1974 retirees in each plan, this information was not available. For this reason, results are valid for 1969 and 1974 retirees only to the extent that these retirees were about the same proportion of all retirees in each plan.

[b]May not add to 100 due to rounding.

[c]Total is less than 76 because North Dakota Public Employees Retirement System was not established until 1977.

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tended to belong to small plans (although this was true to some extent for 1969 retirees). The distribution of increases for retirees closely resembled the distribution of increases for plans.

1. Increases by Plan Type

The 76 pension plans include plans of three types: teacher plans, general employee plans excluding teachers, and general employee plans including teachers. Within each of these three types of plans some plans supplement social security coverage; other plans do not. An interesting question is whether cost of living adjustments were more generous in some types of plans and less generous in others. For example, we might expect adjustments in plans without social security coverage to be more generous than in plans that supplement social security. In the latter plans, retirees presumably have greater protection against inflation because their social security benefits are fully indexed to changes in the CPI.

Table 4 shows the median percentage increases in pension benefits of these plans by plan type. It is useful to look at this table systematically, from top to bottom. The first comparison is between the 61 plans that supplemented social security and the 14 plans (15 in 1969) that did not.* Rather surprisingly,

*Little is known about the extent to which retirees in state plans without social security coverage obtain social security benefits because of outside employment ("moonlighting") during their working years. A study by the Social Security Administration (Price and Novotny, 1977) of federal civil service annuitants in 1975 found that about two out of five annuitants were entitled to social security benefits. Most of these annuitants received benefits on the basis of their own social security covered earnings during their working years.

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TABLE 4

MEDIAN PERCENTAGE INCREASES IN PENSION BENEFITS
BY PLAN CHARACTERISTICS, 1974-1980

Plan Type	(Number of active members; Number of retirees)[a]	1969 Retiree	1974 Retiree	Number of Plans
Social Security Coverage:				
Plans with Social Security Coverage	(6,452,000; 1,462,000)	25	19	(61)
Plans not Social Security Covered	(1,391,000; 352,000)	24	18	(14)[b]
Type of Plan:				
Teacher Plans	(2,669,000; 584,000)	24	14	(25)
General Employee Plans Excluding Teachers	(2,478,000; 686,000)	27	21	(25)
General Employee Plans Including Teachers	(2,696,000; 545,000)	25	21	(25)
Social Security Coverage and Type of Plan:				
Teacher Plans, SS Covered	(1,840,000; 382,000)	19	6	(17)
Teacher Plans, Not SS Covered	(829,000; 202,000)	24	16	(8)
General Employee Plans Excluding Teachers, SS Covered	(2,147,000; 600,000)	27	21	(23)
General Employee Plans Excluding Teachers, Not SS Covered	(332,000; 86,000)	25	23	(2)
General Employee Plans Including Teachers, SS Covered	(2,465,000; 481,000)	23	20	(21)
General Employee Plans Including Teachers, Not SS Covered	(231,000; 65,000)	26	24	(4)[b]
All Plans	(7,844,000; 1,815,000)	25	19	(75)[c]

[a] Membership data pertains to 1980 or most recent figures available.

[b] Numbers pertain to 1974; in one plan, a predecessor to the Florida Retirement System, a 1969 retiree would not be social security covered, so that the number would be one greater in 1969.

[c] Total number is less than 76 because the North Dakota Public Employees Retirement System was not established until 1977.

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cost of living adjustments were on average much the same in both types of plans. A priori it would be reasonable to suppose that adjustments in plans that were not social security covered would have been more generous. Retirees in such plans would either lack social security entirely or have small benefits because of limited social security covered earnings. With little or none of their total retirement benefits comprised of social security, these employees would not have had the same protection against inflation as did retirees in plans that were social security covered. The table shows, however, that on average adjustments in such plans were not more generous.

The second comparison is between teacher plans, general employee plans excluding teachers, and general employee plans including teachers. These three types of plans each had somewhat more than one-half million retirees in 1980. Again, the median cost of living adjustments was much the same in the three different types of plans. The only exception was that cost of living adjustments for 1974 retirees in teacher plans were much lower in relation to the adjustments in other types of plans.

The third comparison is between six groups of plans that result from simultaneously controlling for social security coverage and plan type. Two of these six groups of plans -- general employee plans excluding teachers, not social security covered; and general employee plans including teachers, not social security covered -- include only a few plans and a small number of active members and retirees. Accordingly, we focus on the other groups of plans. A comparison shows that increases in pension benefits between 1974 and 1980 were substantially smaller

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on average in teacher plans, both those with social security coverage and those without. This was particularly true for the 1974 retirees in plans with social security coverage, where on average there was only a six percent increase in pension benefits. An increase of this size would have amounted to less than one-tenth of the increase in the CPI over the same time period.

2. Increases by Type of Adjustment

A common presumption is that cost of living adjustments that are automatic provide better protection against inflation than adjustments that are ad hoc. In one sense, of course, this is certainly true. As indicated above, adjustments that are automatic have features (occur regularly, apply uniformly, do not change arbitrarily) that are on the face of it better than adjustments that are ad hoc. As also indicated, however, adjustments that are automatic almost always have a cap, if based on changes in the CPI, or are limited to a fixed percentage increase that will almost always be less than increases in the CPI. For this reason, adjustments that are ad hoc and are not subject to arbitrary ceilings may actually result in larger increases in pension benefits. This might be especially true for a period of high inflation such as the 1970s, when there was intense political pressure for such ad hoc benefit increases.

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Table 5 shows the median percentage change in pension benefits from 1974 through 1980 for plans using different types of adjustments. We divide plans into four groups: plans that used only automatic adjustments between 1974 and 1980, plans that used only ad hoc adjustments, plans that used both automatic and ad hoc adjustments, and plans that did not adjust. A comparison shows, not surprisingly, that the largest increases occurred in plans that used both automatic and ad hoc adjustments. For 1969 retiree, increases in plans that used only automatic adjustments were about as large as increases in plans that used only ad hoc adjustments. For 1974 retirees, however, increases were larger in plans that used only automatic adjustments. This difference is a result of the channeling of ad hoc adjustments so that the largest benefit increases go to individuals retired the longest (see Table 1 also).

3. Increases by Frequency of Adjustments

There is much variation between plans in the frequency of cost of living adjustments. Some plans adjust benefits annually or even more frequently; other plans adjust benefits only occasionally. This variation, as Table 6 shows, is due in part to the types of adjustments that plans use. Adjustments from the period 1975 to 1980 occurred most frequently in plans that used both automatic and ad hoc adjustments. Adjustments were somewhat less frequent in plans that used

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TABLE 5

MEDIAN PERCENT CHANGE IN PENSION BENEFITS
BY TYPE OF ADJUSTMENTS, 1974-1980

Type of Adjustment	1969 Retiree		1974 Retiree	
	median percent change	number of plans	median percent change	number of plans
Automatic Only	19	17	19	17
Ad Hoc Only	24	34	15	32
Automatic and Ad Hoc	31	22	27	22
No Adjustments	0	2	0	4
All Plans	25	75	19	75

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TABLE 6

NUMBER OF ADJUSTMENTS BY TYPE OF ADJUSTMENTS, 1975 TO 1980

(Number of Plans)

Number of Adjustments 1975 to 1980	Type of Adjustment: Automatic Only	Ad Hoc Only	Automatic and Ad Hoc	No Adjustment	Total
FOR 1969 RETIREES:					
0				2	2
1		10			10
2		5			5
3		6			6
4		6	2		8
5	2	1			3
6	15	6			21
7			8		8
8			3		3
9			2		2
10			2		2
11			3		3
12			2		2
Total Number of Plans					75
FOR 1974 RETIREES:					
0				4	4
1		12			12
2	1	5			6
3	1	4			5
4	3	7	2		12
5	3	1	1		5
6	9	3	2		14
7			9		9
8			2		2
9			1		1
10			2		2
11			2		2
12					0
Total Number of Plans					74

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only automatic adjustments and were least frequent in plans that used only ad hoc adjustments.

There are at least several advantages to retirees of more frequent adjustments. One advantage is that there is less of a time lag between increases in the cost of living and compensating cost of living adjustments. Another, and perhaps more important advantage, is that overall increases in pension benefits tend to be larger in plans in which cost of living adjustments occur more frequently.

Over the period 1975 to 1980, we found that overall increases in pension benefits in plans were correlated positively with both the number of automatic and the number of ad hoc cost of living adjustments.*

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*We used regression analysis to determine this. For 1969 retirees, Multiple R = .33; for 1974 retirees, Multiple R = .40. See Appendix 4 for a detailed explanation of this analysis.

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Replacement Rates

A pension replacement rate is the ratio of pension income to preretirement income, figured as a percentage. Since for most retirees the bulk of their income is comprised of pension income, the replacement rate is a good measure of whether retirees have enough income to maintain the same standard of living that they enjoyed before retirement.

Replacement rates necessary to maintain preretirement standards of living vary according to the individual's marital status and preretirement income. Single persons require a lower replacement rate than do married couples. Those with high income require a lower replacement rate than those with low income. The President's Commission on Pension Policy (1980)* has recently estimated that single persons retiring in 1980 with gross preretirement income of $10,000 required a replacement rate of 73 percent; with income of $20,000, 61 percent; with income of $30,000, 58 percent. Corresponding figures for married couples were 78 percent, 66 percent, and 60 percent respectively.

The replacement rate is a particularly useful concept for determining the deterioration of retirees' standards of living that occurs as a consequence of inflation and erosion of the purchasing power of pension benefits. A pension that is adequate at the time of retirement may soon become inadequate after several years of high inflation. At an inflation rate

* The Commission's position on overall goals for retirement income is presented in its final report (1981).

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of 10 percent, a pension retains 62 percent of its purchasing power after five years, 39 percent after 10 years.

A common misconception is that the automatic cost of living adjustments of social security provide retirees with adequate protection against inflation. This is true, however, only for those retirees for whom social security is a large proportion of retirement income, such as married individuals with low preretirement earnings. For many other retirees, particularly those with high preretirement earnings or those who lack significant social security coverage, social security may not be the largest proportion of retirement income. Such retirees will have inadequate protection against inflation unless sources of retirement income other than social security, such as private and public pensions, adjust for inflation.

For many retirees who were employed in state and local governments, social security is not the major source of retirement income. This is particularly true of retirees who were employed 30 or more years by state and local governments and received high salaries in their last years of employment.

To analyze replacement rates in the plans surveyed in this study we estimated final salaries for hypothetical career (30 years service) public employees in each state who retired in 1969 and 1974. We estimated salary histories for general public employees by using data from the Census of Governments, 1972, and we estimated salary histories for teachers by using data published in the annual publication, Estimates of School Statistics (see Appendix 3).

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We then calculated the initial pension benefits for 1969 and 1974 career public employees retiring under the various plans in our survey. We used the normal service retirement benefit formulas that were in effect in each plan during the year of retirement to calculate benefits. To calculate the initial replacement rate (replacement rate at the date of retirement), we divided the initial pension benefit by the final salary and multiplied by 100 to get a percentage.

We also calculated initial social security benefits for retirees in plans that had social security benefits. The benefits are those that would be obtained at age 65 and do not include spouse benefits. We added these initial social security benefits to pension benefits to obtain initial total pension benefits. Then, to calculate the initial "total" replacement rate, we divided the initial total pension benefit by the final salary and multiplied by 100 to get a percentage.

We also report on calculations that include spouse benefits.* The effect of spouse benefits, of course, is to increase replacement rates. However, the replacement rate that is necessary for a couple to maintain its standard of living is always higher, at every earnings level, than the replacement rate that is necessary for a single person to maintain his standard of living. At a $20,000 earnings level, as indicated

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*We assume that the spouse is also age 65. Otherwise the spouse's benefit is reduced 25/36 percent for each month the spouse's age is less than 65.

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above, a couple requires a replacement rate of 66 percent, whereas a single person requires a replacement rate of 61 percent. Couples who receive the spouse benefit, therefore, do not necessarily enjoy a higher standard of living.

We calculated 1980 pension benefits by adding any increases in pension benefits due to cost of living adjustments to initial pension benefits.* We calculated 1980 social security benefits by adjusting such benefits for cost of living increases after retirement. To calculate 1980 replacement rates, we first calculated 1980 pension benefits. We converted these benefits to constant retirement date dollars. For 1969 retirees, we converted to July 1969 dollars; for 1974 retirees, we converted to July 1974 dollars. Our next step was to divide by the final salary and then multiply by 100 to get a percentage. A similar method was used to calculate the 1980 "total" replacement rate.

Table 7 shows the distribution of pension plan replacement rates (not including social security benefits) for 1969 and 1974 retirees. It also shows, based on weighted data, the distribution of replacement rates for 1969 and 1974 retirees. Table 8 shows the distribution of pension plan total replacement

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*Some of the increases in some plans were due to retroactively applied formula changes (see Appendix 2).

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TABLE 7

DISTRIBUTION OF REPLACEMENT RATES FOR 1969 AND 1974 RETIREES, EXCLUDING ANY SOCIAL SECURITY BENEFITS

Replacement Rate	1969 Retirees[a]				1974 Retirees[b]			
	Rate at Retirement		Rate in 1980		Rate at Retirement		Rate in 1980	
(%)	Plans (%)	Retirees[c] (%)	Plans (%)	Retirees (%)	Plans (%)	Retirees (%)	Plans (%)	Retirees (%)
0-9	4	1	4	1	1	-	4	1
10-19	3	2	17	14	4	2	5	4
20-29	14	9	37	39	11	6	29	21
30-39	12	14	28	28	15	12	43	51
40-49	37	25	12	17	29	20	13	19
50-59	25	46	1	1	31	45	5	4
60-69					4	10		
70-79	5	4			5	4		
Total Percent[d]	100	100	100	100	100	100	100	100
Total Plans		73[e]		75		75		75
Median or (Weighted Median) Replacement Rate	44	(47)	28	(29)	45	(52)	34	(37)

[a]Benefits calculated in constant 1969 dollars.

[b]Benefits calculated in constant 1974 dollars.

[c]The distributions for retirees are based on weighted plan data with weights set equal to the number of all retirees in each plan. While it would be more appropriate to set weights equal to the number of 1969 retirees or to the number of 1974 retirees in each plan, this information was not available.

[d]May not add to 100 due to rounding.

[e]Total number of plans is less than 75 because we were unable to calculate pension benefits for 1969 retirees at the date of retirement in the Public Employee Retirement System of Idaho (due to a change in plan type) and in the South Dakota Retirement System (due to a change in the retirement system).

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TABLE 8

DISTRIBUTION OF REPLACEMENT RATES FOR 1969 AND 1974 RETIREES, INCLUDING ANY SOCIAL SECURITY BENEFITS

Replacement Rate	1969 Retirees[a]				1974 Retirees[b]			
	Rate at Retirement		Rate in 1980		Rate at Retirement		Rate in 1980	
(%)	Plans (%)	Retirees[c] (%)	Plans (%)	Retirees (%)	Plans (%)	Retirees (%)	Plans (%)	Retirees (%)
0-9								
10-19								
20-29	4	1	8	9				
30-39	1	2	13	14	1	-	12	14
40-49	18	13	29	30	4	2	28	22
50-59	27	29	32	22	23	23	16	20
60-69	30	22	19	26	19	18	36	40
70-79	16	32			35	32	8	4
80-89	3	1			13	22		
90+					4	2		
Total Percent[d]	100	100	100	100	100	100	100	100
Total Plans	73[e]		75		75		75	
Median or (Weighted Median) Replacement Rate	59	(63)	49	(48)	71	(74)	56	(56)
With Spouse Benefit	70	(71)	60	(58)	81	(87)	70	(67)

[a]Benefits calculated in constant 1969 dollars.

[b]Benefits calculated in constant 1974 dollars.

[c]See Footnote (c), Table 7.

[d]May not add to 100 due to rounding.

[e]See Footnote (e), Table 7.

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rates (including social security benefits) for 1969 and 1974 retirees. It also shows, based on weighted data, the distribution of total replacement rates for 1969 and 1974 retirees. Measures of the impact of spouse benefits on median replacement rates are given at the bottom of Table 8.

Table 7 shows that the initial pension plan replacement rates were about the same for both the 1969 retirees and the 1974 retirees -- medians of 44 percent and 45 percent respectively. In most plans initial replacement rates were in the range of 30 to 50 percent. The reason for this is the high incidence in these plans of benefit formulas of the form "percent times years of service times final average salary." Percents are generally in the range of one to two. A 30 year career employee in a one percent plan would obtain a benefit equal to 30 percent of "final average salary"; a 30 year career employee in a two percent plan would obtain a benefit equal to 60 percent of final average salary. In most plans final average salary is determined by averaging the highest salaries obtained for either three or five years in the period preceding retirement. For career employees, of course, the highest salaries will most likely be obtained in the years immediately preceding retirement, and "final average salary" will typically be somewhat less than the final salary. As a result, the replacement rate in a plan is typically somewhat less than the plan percent multiplied by the number of years of service.

Table 8 shows that initial total replacement rates in the surveyed plans were 59 percent for 1969 retirees and 71 percent

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for 1974 retirees. The higher percent for 1974 retirees is due in large part to liberalization of the social security benefit formula between 1969 and 1974.

In order to determine target replacement rates for comparison purposes, we estimated the retirement income that was equivalent to the preretirement gross income of 1969 and 1974 retirees with median final salaries. The median final salary for 1969 retirees in the surveyed plans was $10,424; the median final salary for 1974 retirees was $14,201. For 1969 retirees, we estimated that a total replacement rate of 69 percent would be necessary, of which 51 percent would be attributable to the pension and 18 percent to social security. For 1974 retirees, we estimated that a total replacement rate of 68 percent would be necessary, of which 42 percent would be attributable to the pension and 26 percent to social security.

To estimate these percents, we did the following. First, we estimated the disposable preretirement income of employees with median final salaries (ignoring nonearnings sources of income). We did this by subtracting social security taxes, federal income taxes, and state and local income taxes from final salaries. We calculated income taxes by using either the 1969 or 1974 tax schedules, as appropriate, and using standard deductions. We assumed (based on estimates by the President's Commission on Pension Policy, 1980) state and local taxes to be 13.1 percent of federal income taxes.

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Next, we estimated the retirement income that would be necessary (net of taxes) to replace 100 percent of disposable preretirement income. We did this by subtracting savings and work related expenses from preretirement disposable income, since savings during retirement are presumably unnecessary and work related expenses are zero. Savings were assumed to equal five percent of final salary. Work related expenses were assumed to equal six percent of final salary.

Next, we determined the pension benefits that in addition to social security benefits would equal the retirement income necessary to replace 100 percent of disposable preretirement income. This was done by an iterative method, using the appropriate tax tables using standard deductions and appropriate exemptions. For 1969 retirees, this pension amount was $5,305. For 1974 retirees, this pension amount was $6,033. These dollar amounts were divided by final earnings to obtain the 51 percent and 42 percent figures for pension replacement rates.

If we use 69 percent as a target replacement rate for total pension income for 1969 retirees, only 15 plans achieved this goal for 1969 retirees at the date of retirement. If we use 68 percent as a target replacement rate for 1974 retirees, 42 plans achieved this goal for 1974 retirees at the date of retirement.

It is apparent that substantially more state plans met target replacement rates for new retirees in 1974 than in 1969.

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There were a number of reasons for this. The most important reason was substantial real increases in social security benefits over the period 1969 to 1974, due especially to the ad hoc increase of 1972. State plans which supplemented social security did not need as high a pension replacement rate for 1974 retirees to meet a target replacement rate because of these large increases in social security benefits. A second reason was improvement in the benefit formulas of some plans. A third reason was that 1974 retirees had higher salaries and therefore required lower replacement rates.

1. Replacement Rates During Retirement

The median pension plan replacement rate in 1980 for 1969 retirees was 28 percent. This was a substantial drop from the median of 44 percent in 1969. The median pension plan replacement rate in 1980 for 1974 retirees was 34 percent. This was also a substantial drop (from 45 percent) but somewhat less than the drop for 1969 retirees who had been retired five years longer. These drops in replacement rates clearly indicate that cost of living adjustments in pension plans administered by state governments did not keep pace with inflation.

The median <u>total</u> pension plan replacement rate in 1980 for 1969 retirees was 49 percent, a 10 percent point drop from 1969. The median total replacement rate in 1980 for 1974 retirees was 56 percent, a 15 percent point drop from 1974. The somewhat larger drop in the medians for 1974 retirees

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was due largely to two things: the large ad hoc increase in social security benefits in 1972 that was received by 1969 retirees, and the fact that state benefits for 1974 retirees were a greater part of their total pension benefits, given that a greater proportion of earnings during their career exceeded the taxable wage base.

If we use the same target replacement rate of 69 percent for 1969 retirees, none of the plans maintained the standard of living of 1969 retirees (in contrast to 15 plans that did so in 1969, at the date of retirement). If we use the same target replacement rate of 68 percent for 1974 retirees, only 11 plans maintained the standard of living of 1974 retirees (in contrast to 42 plans that did so in 1974, at the date of retirement). Thus, it appears that the standard of living of most career state and local employees who retired either in 1969 or in 1974 has declined substantially since retirement.

2. Replacement Rates by Plan Type

There is substantial variation in the replacement rates of state administered pension plans by type of plan. Table 9 shows this variation. Since the table is lengthy, we will discuss it systematically, from top to bottom.

For plans that are social security covered we present two replacement rates -- a pension replacement rate (that does not include social security benefits) and a total replacement rate (that includes social security benefits). For plans that are

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TABLE 9

MEDIAN REPLACEMENT RATES BY PLAN TYPE

A. IN PLANS WITH AND WITHOUT SOCIAL SECURITY COVERAGE

	Median Replacement Rates							
	For a 1969 Retiree				For a 1974 Retiree			
	in 1969		in 1980		in 1974		in 1980	
Plan Type	Pension Only	Pension Plus SS	Pension Only	Pension Plus SS	Pension Only	Pension Plus SS	Pension Only	Pension Plus SS
Plans that are Social Security Covered	40	62	25	52	-3	73	31	61
Plans that are not Social Security Covered	54		36		[illegible]		45	

B. IN DIFFERENT TYPES OF STATEWIDE PLANS

Teacher Plans	46	57	29	43	[illegible]	66	34	48
General Employee Plans Excluding Teachers	42	66	28	53	--	75	34	61
General Employee Plans Including Teachers	41	57	26	44	-3	67	31	55

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TABLE 9 (Continued)

MEDIAN REPLACEMENT RATES BY PLAN TYPE

C. IN DIFFERENT TYPES OF STATEWIDE PLANS WITH AND WITHOUT SOCIAL SECURITY COVERAGE

	Median Replacement Rates							
	For a 1969 Retiree				For a 1974 Retiree			
	in 1969		in 1980		in 1974		in 1980	
Plan Type	Pension Only	Pension Plus SS	Pension Only	Pension Plus SS	Pension Only	Pension Plus SS	Pension Only	Pension Plus SS
Teacher Plans, SS Covered	38	59	24	51	45	75	31	62
Teacher Plans, Not SS Covered	53		35		56		38	
General Employee Plans Excluding Teachers, SS Covered	42	66	27	54	44	75	34	61
General Employee Plans Excluding Teachers, Not SS Covered	64		41		65		48	
General Employee Plans Including Teacher, SS Covered	40	57	24	45	40	67	29	55
General Employee Plans Including Teachers, Not SS Covered	54		40		62		47	

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not social security covered we present only the pension replacement rate. However, this would also be equal to the total replacement rate under the assumption that individual career workers covered by such plans do not have social security coverage.* We present replacement rates for both the 1969 and the 1974 retirees. Initial replacement rates are those at the date of retirement (1969 for the 1969 retiree; 1974 for the 1974 retiree). "Current" replacement rates are those in 1980. They include the effects of any increases in pensions and social security benefits due to cost of living adjustments. All benefit amounts received in 1980 were deflated to account for declines in their purchasing power since the date of retirement (as measured by the CPI).

Section A of Table 9 contrasts replacement rates in plans with social security coverage with rates in plans without social security coverage. This contrast is interesting because of widespread agreement among pension specialists that pension replacement rates should be higher and cost of living adjustments more generous in plans without social security coverage. Although pension replacement rates were higher on average in the plans of this study without social security coverage, these pension

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*See footnote on page 31.

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replacement rates were less than the total replacement rates in plans that were social security covered.

A comparison also shows that there were marked declines in replacement rates in both types of plans for both 1969 and 1974 retirees in spite of cost of living adjustments. The most serious decline occurred for 1969 retirees in plans without social security coverage -- from 54 percent to 36 percent. There appear to be two reasons for the somewhat better situation of retirees in plans that were social security covered. First, initial total replacement rates were higher in such plans. Second, the social security portion of their total pension benefits was adjusted for increases in the CPI since the date of retirement. For 1969 retirees, social security benefits increased 175 percent, versus a 125 percent increase in the CPI. For 1974 retirees, social security benefits increased 63 percent, versus a 67 percent increase in the CPI.*

Section B of Table 9 contrasts replacement rates in teacher plans, general employee plans excluding teachers, and general employee plans including teachers. A comparison shows that

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*Increases in social security benefits for 1969 retirees were greater than inflation because of the large ad hoc increase of 1972; increases in social security benefits for 1974 retirees were less than inflation because adjustments are based on the yearly change in the CPI from the first quarter of the preceding calendar year, so that there is a three month lag.

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initial pension replacement rates were somewhat higher in teacher plans. Pension replacement rates in 1980, however, were much the same in all three types of plans, which indicates that cost of living adjustments were less generous in teacher plans. Initial total replacement rates were highest in general employee plans excluding teachers. The reason for this is that the earnings of general employees were somewhat lower than teachers, so that a somewhat greater proportion of their total pension benefits were comprised of social security benefits. Since social security replacement rates are higher at lower earnings levels, this raised the replacement rate in general plans.

Section C of Table 9 contrasts replacement rates in six different plan types. Let us first examine initial replacement rates, or replacement rates at the date of retirement. For 1969 retirees, initial median pension replacement rates in these six different types of plans ranged from 38 to 64 percent. The highest initial pension replacement rates existed in the small number of general employee plans excluding teachers (not social security covered).

For 1969 retirees, initial median total replacement rates ranged from 53 to 66 percent (assuming that there was no social security supplementation in plans without social security coverage). For 1974 retirees, initial median total replacement rates ranged from 56 to 75 percent. Initial total replacement rates were highest in teacher plans (social security covered)

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and in general employee plans excluding teachers (social security covered). Initial total replacement rates were lowest in teacher plans (not social security covered).

Let us next examine current replacement rates, or replacement rates in 1980. For 1969 retirees, median pension replacement rates in 1980 ranged from 24 to 41 percent. For 1974 retirees, median pension replacement rates in 1980 ranged from 29 to 48 percent. It is clear, for all types of plans, that pension replacement rates in 1980 were substantially lower than pension replacement rates at the date of retirement. The declines in replacement rates were largest in teacher plans (not social security covered) and in general employee plans excluding teachers (not social security covered).

For 1969 retirees, median total replacement rates in 1980 ranged from 35 to 54 percent (assuming that there was no social security supplementation in plans without social security coverage). For 1974 retirees, median total replacement rates in 1980 ranged from 38 to 62 percent. Total replacement rates in 1980 were highest in general employee plans excluding teachers (not social security covered). Total replacement rates in 1980 were lowest in teacher plans (not social security covered). It is evident that declines in total replacement rates had less disastrous effects on the standards of living of retirees in the types of plans that had social security coverage and that had higher total replacement rates at the date of retirement.

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Table 9 shows clearly the injurious impact of inflation during the 1970s on the standard of living of retirees in pension plans administered by state governments. Using our previous target replacement rates for 1969 and 1974 retirees who were career public employees, most plans fell short of this goal in 1980, particularly for the 1969 retirees. This was true regardless of the type of plan. Among various types of plans, plans without social security coverage typically did worse than other plans in maintaining the standard of living of retirees.

Summary*

Cost of living and other postretirement adjustments were in widespread use over the period 1975 to 1980 in state pension plans. Over this period, 73 of 76 plans that were surveyed adjusted benefits. The largest number of plans used only ad hoc adjustments (34 plans). Somewhat fewer plans (22) used both automatic and ad hoc adjustments. The smallest number of plans (17) used only automatic adjustments. Methods of adjustment were often quite complex. In many cases the largest benefit increases went to those who were retired the longest. Contrary to common supposition, plans at the state level that used only automatic adjustments usually did not provide larger increases in pension benefits than plans that used only ad hoc adjustments. One reason for this was the presence of caps or fixed percentages in nearly all of the plans that used

*Information on inflation adjustments by specific plans in various states is available in Appendix 5.

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automatic adjustments. Another reason is that plans that used only ad hoc adjustments and did not adjust benefits very frequently compensated for this by giving larger adjustments.

There was great variation between plans in the size of postretirement pension increases. Some plans were relatively generous; other plans were not so generous. Very few plans adjusted benefits fully for changes in the cost of living as measured by changes in the CPI. As a consequence, the purchasing power of the benefits of retirees in nearly all of the plans declined. In comparing types of plans, we found that teacher plans had the least generous cost of living adjustments. Moreover, individuals in teacher plans who retired in 1974 appear to have suffered the most pension income erosion.

Overall, there has been a substantial amount of erosion in the standard of living of retirees in state plans, as measured by decreases in replacement rates. The retirees most seriously affected by such erosion are those who have been retired the longest and those without social security coverage. At the beginning of the 1970s many career employees of state and local governments who were approaching retirement probably looked forward to a rather comfortable retirement. Virtually all of these employees who retired during the 1970s, however, found retirement to be much less comfortable than they probably thought it would be. The principal reason was the failure of their public pensions to keep pace with inflation.

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APPENDICES

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APPENDIX 1

PLANS CONTACTED

1. Teachers' Retirement System of Alabama
2. Alabama Retirement System
3. Alaska Teachers' Retirement System
4. Alaska Public Employees' Retirement System
5. Arizona State Retirement System
6. Teacher Retirement System of Arkansas
7. Arkansas Public Employees Retirement System
8. State Teachers' Retirement System (California)
9. Public Employees' Retirement System (California)
10. Public Employees' Retirement Association of Colorado
11. State of Connecticut Teachers' Retirement System
12. State Employees Retirement System (Connecticut)
13. Delaware State Employees
14. Florida Retirement System
15. Teachers Retirement System of Georgia
16. Employees' Retirement System of Georgia
17. Employees' Retirement System (Hawaii)
18. Public Employee Retirement System of Idaho
19. Teachers' Retirement System of the State of Illinois
20. State Employees' Retirement System of Illinois
21. Indiana State Teachers' Retirement Fund
22. Indiana Public Employees' Retirement Fund
23. Iowa Public Employees Retirement System
24. Public Employees Retirement System (Kansas)
25. Teachers' Retirement System of the State of Kentucky

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26. Kentucky Retirement System
27. State of Louisiana State Employees' Retirement System Law
28. Maine State Retirement System
29. Maryland State Retirement System
30. Massachusetts Employees' Retirement System
31. Michigan Public School Employees' Retirement System
32. Michigan State Employees' Retirement System
33. State of Minnesota Teachers Retirement Association
34. Minnesota State Retirement System
35. Public Employees' Retirement System of Mississippi
36. The Public School Retirement System of Missouri
37. Missouri State Employees' Retirement System
38. Montana Teachers' Retirement System
39. Public Employee Retirement System (Montana)
40. Nebraska School Employees Retirement System
41. State Employees Retirement System (Nebraska)
42. Public Employees' Retirement System of Nevada
43. New Hampshire Retirement System
44. New Jersey Public Employees' Retirement System
45. The Educational Retirement Board of New Mexico
46. The Public Employees' Retirement Association of New Mexico
47. New York State Teachers' Retirement System
48. New York Employees' Retirement System
49. Teachers' and State Employees' Retirement System of North Carolina
50. North Dakota Teachers' Fund for Retirement
51. North Dakota Public Employees Retirement System

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52. State Teachers Retirement System of Ohio
53. Public Employees Retirement System of Ohio
54. Teachers' Retirement System of Oklahoma
55. Oklahoma Public Employees Retirement System
56. Oregon Public Employes Retirement System
57. The Pennsylvania Public School Employees' Retirement System
58. Pennsylvania State Employes' Retirement System
59. Employees Retirement System and Judiciary Retirement System (Puerto Rico)*
60. Employees' Retirement System of the State of Rhode Island (general employee tier)
61. Employees' Retirement System of the State of Rhode Island (teacher tier)
62. South Carolina Retirement System
63. South Dakota Retirement System
64. Tennessee Consolidated Retirement System
65. Teachers Retirement System of Texas
66. Employees Retirement System of Texas
67. Utah State Retirement System
68. State Teachers' Retirement System (Vermont)
69. Vermont State Retirement System
70. Virginia Supplemental Retirement System
71. Washington State Teachers' Retirement System
72. Washington State Public Employees' Retirement System
73. West Virginia Teachers Retirement System
74. West Virginia Public Employees Retirement System
75. Wisconsin Retirement System
76. Wyoming Retirement System
77. Massachusetts Teachers Retirement System

*Not contacted.

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APPENDIX 2

SPECIAL NOTES ON PLANS

Plan Number	
1	Cost of living adjustments for both 1969 and 1974 retirees include retroactive formula changes.
2	Cost of living adjustments for both 1969 and 1974 retirees include retroactive formula changes.
3	Cost of living adjustment includes 10 percent postretirement pension adjustment.
4	System withdrew from social security program in 1979; cost of living adjustment includes 10 percent postretirement pension adjustment.
9	Assumes employee whose pension benefits are coordinated with social security.
12	Assumes teacher with Plan B coverage who is coordinated with social security.
14	1969 retiree would have spent entire career under predecessor to Florida Retirement System and would not have been social security covered; 1974 retiree assumed to have transferred to the Florida Retirement System in December 1970.
15	Semi-annual cost of living adjustments.
16	Semi-annual cost of living adjustments.
20	Assumes that 1969 retiree joined money purchase cost of living adjustment plan.
29	Benefits of 1969 retiree increased as a result of retroactive formula changes in 1970 and 1973.
31	Assumes 1974 retiree is social security qualified.
33.	Assumes 1974 retiree is coordinated with social security.
37	Cost of living adjustments for both 1969 and 1974 retirees include retroactive formula change.
40	1969 retiree receives new benefit formula amount in 1974 rather than cost of living adjustment.
41	Money purchase plan benefits estimated assuming four percent interest rate 1963-1969, six percent interest rate 1970-1974 and using TIAA/CREF single life annuity table for male retiree age 65; cost of living adjustments estimated based on age of 1969 and 1974 retirees at time of adjustment and information furnished by plan on "average" adjustment received by annuitants.

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Plan Number	
43	Assumes 1969 retiree did not elect refund of contributions; Group I members.
47	Assumes no contribution to annuity fund in which participation is voluntary.
50	Assumes 1969 retirees received new benefit formula amount in 1973.
51	System was established in 1977.
54	Cost of living adjustments for both 1969 and 1974 retirees include numerous retroactive formula changes.
55	Benefits of 1969 retirees increased as a result of retroactive formula change in 1976.
56	Assumes pension based on employer contributions only ; employees may receive annuity or lump sum payment based on their own contributions.
57	Assumes employees did not elect social security integration coverage.
63	1969 retirees were allowed benefits under either new or older retirement systems; assume 1974 retirees not integrated with social security.
64	Assumes that 1978 bonus and subsequent bonuses were fully implemented and not prorated; cost of living adjustments for both 1969 and 1974 retirees include retroactive formula changes.
66	Cost of living adjustments for both 1969 and 1974 retiree include estimated ad hoc benefit increases based on retroactive formula changes.
72	Cost of living adjustments in 1970 calculated on annuity portion of benefit and cost of living adjustment in 1971 calculated on pension portion of benefit.
73	Assumes use of benefit formula 2.
76	Money purchase plan; see note for plan 41.

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APPENDIX 3

CALCULATION OF SALARIES

We based our estimates of yearly salaries on two data sources, depending on the type of plan.

A. Teacher Only Plans

For teacher only plans, salary data were based on information published by the National Education Association (NEA) which is contained in its annual report Estimates of School Statistics. This publication provides estimates for each state of the average school year salaries and distribution of salaries of classroom teachers. The salary data available to us from NEA spanned the school years 1964-65 through 1973-74.

A number of assumptions are necessary in order to estimate the salary pattern of a career teacher. We assumed that a teacher who retired with 30 years of service would have a salary for years 16 through 30 at the 90th percentile of the distribution of all classroom teacher salaries in the state. For years 11 through 15 we assumed that such a teacher would have a salary equal to 120 percent of the statewide average salary. For years 6 through 10 we assumed a salary equal to 100 percent of the statewide average salary. And for years 1 through 5 we assumed a salary equal to 80 percent of the statewide average salary.

For the 1974 retiree we proceeded as follows. Actual salary data at the 90th percentile were used for school years 1964-65 through 1973-74. Whenever the 90th percentile fell within a salary interval we interpolated using a straight line method. Whenever the 90th percentile fell within the maximum salary interval (e.g., $11,500 and above) we assumed that the

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upper salary bound was equal to 130 percent of the lower bound and interpolated as above. In general this method was applied frequently to only a few states such as Alaska, California, New Jersey, New York, and Michigan with relatively high teacher salaries. For school year 1973-74 the NEA did not give information on the distribution of classroom teacher salaries. To estimate the 90th percentile in that school year we added the percentage increase in average classroom salary between school years 1972-73 and 1973-74 to the 90th percentile salary in school year 1972-73.

Salaries for school years 1959-60 through 1963-64 were estimated by wage indexing the 90th percentile salary for school year 1964-65. We used the wage index calculated by the Bureau of Labor Statistics for the average weekly earnings of production or nonsupervisory workers on nonagricultural payrolls. In using this index we assume that teacher salaries during these years changed in a fashion similar to wages in the private nonagricultural sector.

Salaries for school years 1954-55 through 1958-59 were estimated by wage indexing the average salary for school year 1964-65 and multiplying by 120 percent. Salaries for school years 1949-50 through 1953-54 were estimated by wage indexing the average salary for school year 1964-65 and multiplying by 100 percent. Salaries for school years 1944-45 through 1948-49 were estimated by wage indexing the average salary for school year 1964-65 and multiplying by 80 percent. The BLS wage index dates back to 1947. For earlier years a three percent annual rate of growth in wages was assumed.

Since nearly all of the teacher plans have a benefit formula based on final average salary (either high three or high five formulas), our

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estimates of pension benefits for the 1974 retiree would be based on actual salary data furnished by the NEA. Our estimates of social security benefits for the 1974 retiree would be based on actual salary data furnished by the NEA and our salary estimates for the years 1955-56 through 1963-64. In most cases our salary estimates would be irrelevant to the determination of average monthly earnings since these estimates exceeded maximum taxable earnings.

For the 1969 retiree we proceeded in much the same fashion as we did for the 1974 retiree. For the 1969 retiree, however, actual salary data were available only for school years 1964-65 through 1968-69. For school years 1954-55 through 1963-64, salaries were estimated by wage indexing salary data at the 90th percentile for school year 1964-65. For school years 1949-50 through 1953-54, salaries were estimated by wage indexing the average salary for school year 1964-65 and multiplying by 120 percent. For school years 1944-45 through 1948-49 salaries were estimated by wage indexing the average salary for school year 1964-65 and multiplying by 100 percent. For school years 1939-40 through 1943-44 salaries were estimated by wage indexing the average salary for school year 1964-65 and multiplying by 80 percent.

The extent to which our salary data represent the actual earnings patterns of career teachers, of course, depends on the accuracy of the NEA data and the appropriateness of our assumptions. We feel that our assumptions are reasonable and probably do not greatly distort the actual earnings patterns of career teachers.

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B. General Employee Plans Including Teachers

For general employee plans including teachers, salary data were based on information contained in the Census of Governments, 1972. This study contains information on average October 1972 salaries of employees of state and local governments.

A number of assumptions were necessary in order to estimate the salary pattern of a career employee participating in such a plan. We assumed that a career employee who retired with 30 years service would have a salary for years 16 through 30 of 140 percent of the statewide average salary. Since there was no information in the Census of Governments on the distribution of salaries of employees of state and local governments, our selection of the 140 percent figure is a guess based on other information. We made this guess based on the nationwide distribution of teachers' salaries in school year 1972-73 (based on NEA data). In that year the average nationwide teacher's salary was $10,164. The 90th percentile salary was $14,058 (138 percent of the average salary). We rounded to 140 percent. Our assumption, therefore, is reasonable to the extent that the distribution of all state and local employee salaries resembles that of teachers. For years 11 through 15, we assumed a salary of 120 percent of the statewide average salary. For years 6 through 10, we assumed a salary of 100 percent of the statewide average salary. For years 1 through 5, we assumed a salary of 80 percent of the statewide average salary.

Salary data contained in the Census of Governments, 1972 pertain only to the month of October. For general employee plans including teachers, we took the figure for "average October earnings, full-time employees," for all employees of both state and local governments, and multiplied by

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12 to get an average yearly salary for 1972. To estimate the statewide average salary for other years we used the BLS wage index. Salary estimates for employees in plans of this type, therefore, would be subject to error to the extent that the BLS index does not give an accurate picture of salary changes in a particular state prior to 1972 or subsequent to 1972.

C. General Employee Plans Excluding Teachers

For general employee plans excluding teachers, salary data were also based on information contained in the Census of Governments, 1972. The method used was similar to the method used in general employee plans including teachers, with one difference. For general employee plans excluding teachers an average yearly salary for 1972 was estimated by calculating a weighted average of the salaries of state employees (excluding teachers) and the salaries of local employees (excluding teachers). Weights were based on the proportion that state employees (excluding teachers) and local employees (excluding teachers) comprised of all state and local employees (excluding teachers).

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APPENDIX 4

METHODOLOGICAL NOTE: INCREASES IN PENSION BENEFITS BY FREQUENCY AND TYPES OF ADJUSTMENTS

To analyze the relationship over the period 1975 to 1980 between the frequency and the magnitude of increases, we used regression analysis. This statistical technique enables us to estimate the average percentage effect on pension benefits of adjustments of different types. We obtained estimates for both 1969 and 1974 retirees. The dependent variable is the percentage change in pension benefits in each plan over the period 1975 to 1980. There are three independent variables. The first independent variable is the number of automatic adjustments in each plan over the period 1975 to 1980. The second independent variable is the number of ad hoc adjustments in each plan over the period 1975 to 1980. The third independent variable is a polynomial -- the square of the number of ad hoc adjustments in each plan over the period 1975 to 1980 -- to allow for a nonlinear relationship between the number of ad hoc adjustments and the percentage change in pension benefits. We allow for a nonlinear relationship because of the possibility that plans that gave only a few ad hoc adjustments compensated for this by giving large adjustments.

For 1969 retirees, the estimation equation was PERC69 = 12.9 + 1.7 AUTO69 + 8.3 ADHOC69 - 1.0 ADHOCSQ69, where PERC69 is the percentage increase in pension benefits, AUTO69 is the number of automatic adjustments, ADHOC69 is the number of ad hoc adjustments, and ADHOCSQ69 is the square of the number of ad hoc adjustments. For 1974 retirees, the estimation equation was PERC74 = 7.5 + 2.5 AUTO74 + 8.5 ADHOC74 - 1.2 ADHOC74SQ.

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Looking at the equation for 1969 retirees, it is evident that each automatic adjustment resulted in about 1.7 percent increase in pension benefits over the 1975 to 1980 period.* For 1974 retirees the corresponding number was 2.4 percent. The higher percent for 1974 retirees reflects two things: 1974 retirees received fewer automatics because of waiting periods, and the automatics that 1974 retirees received were larger on average because of increases in caps and fixed percentages between 1975 and 1980.

The average effects of ad hoc adjustments on pension benefits were more complicated than those of automatic adjustments. The reason for this is that plans with only a few ad hoc adjustments tended to give rather large adjustments whereas plans with many ad hoc adjustments tended to give rather small adjustments. We can use the nonlinear estimation equations, however, to estimate these average effects for different numbers of ad hoc adjustments. For 1969 retirees in plans with a single ad hoc adjustment, that adjustment was worth about 7.3 percent; for 1969 retirees in plans with six ad hoc adjustments, each adjustment was worth about 2.3 percent. For 1974 retirees in plans with a single ad hoc adjustment, that adjustment was worth about 8.5 percent; for 1974 retirees in plans with six ad hoc adjustments, each adjustment was worth about 1.3 percent. This indicates that 1969 retirees generally did better than 1974 retirees in plans that used a large number of ad hoc adjustments.

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*It is difficult to interpret the meaning of the intercepts in each of the equations since it is obvious that if there are no adjustments there are no increases in pension benefits. It is apparent to us that the intercepts are not equal to zero because of larger estimation errors for plans making only a few ad hoc adjustments.

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APPENDIX 5

PLAN DATA

Benefit Adjustments for 1969 Retirees, by State Plan

Variables:	*Percent Increase	1969 Benefit	1980 Benefit	Final Salary	1969 Replacement	1980 Replacement
State Plan**	(PERC69)	(BENE69)	(BENE69)	(FSALA69)	(REPLA69)	(REPLA69)
1	38.9	2460.	4794.	7152.	33.	29.
2	16.3	2958.	4616.	7372.	40.	28.
3	34.8	7589.	12412.	13510.	56.	41.
4	34.8	8456.	13863.	14948.	57.	41.
5	11.1	3854.	5180.	11210.	34.	21.
6	31.4	3500.	6167.	7551.	46.	36.
7	39.2	3164.	4734.	6475.	49.	32.
8	30.4	7560.	10365.	13450.	56.	36.
9	43.1	7428.	12968.	12550.	59.	43.
10	47.3	5650.	9323.	10498.	54.	40.
11	24.1	6145.	8566.	10500.	59.	36.
12	26.5	4711.	6695.	10372.	43.	27.
13	24.9	4537.	5669.	10028.	45.	25.
14	19.4	5072.	6711.	10226.	50.	29.
15	28.4	3841.	5557.	8426.	46.	29.
16	20.7	2644.	3720.	7357.	36.	22.
17	22.7	8046.	9871.	11460.	70.	38.
18	37.8	99999.	6212.	8593.	-1.	32.
19	19.8	4668.	6126.	10700.	44.	25.
20	13.2	3483.	4179.	11322.	31.	16.
21	41.2	3244.	4579.	11053.	29.	18.
22	12.1	1927.	2731.	7061.	24.	15.
23	112.5	1316.	2797.	10168.	13.	12.
24	16.8	2294.	3067.	9212.	25.	13.
25	34.8	3808.	6009.	7625.	50.	35.
26	29.4	3415.	4714.	8354.	41.	25.
27	32.2	5492.	8348.	7342.	75.	51.
28	33.0	5253.	8555.	9268.	57.	41.
29	62.8	5523.	12090.	11927.	47.	45.
30	24.4	8216.	11758.	11617.	71.	45.
31	16.6	3477.	4536.	10500.	33.	19.
32	8.0	4753.	5551.	11573.	41.	21.
33	18.8	2518.	4055.	10500.	24.	17.
34	30.0	2594.	4494.	10257.	25.	19.
35	17.0	3024.	3947.	7426.	41.	24.
36	14.0	4042.	4608.	8650.	47.	24.
37	59.2	2306.	3647.	8497.	27.	19.
38	18.0	2721.	4028.	8205.	33.	22.
39	53.4	3438.	5779.	8509.	40.	30.
40	0.0	615.	1137.	8749.	7.	6.
41	5.9	415.	439.	8163.	5.	2.
42	25.9	4993.	6759.	11406.	44.	26.
43	17.0	3855.	4510.	9649.	40.	21.
44	41.7	5868.	9255.	12447.	47.	33.
45	12.6	4166.	4798.	9058.	46.	22.
46	17.3	3588.	4735.	7932.	45.	27.
47	18.0	4732.	5584.	11350.	42.	22.

*See variable description at end of the appendix.

**See Appendix 1 for the name of the plan. For example, Plan 1 is the Teachers' Retirement System of Alabama.

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Benefit Adjustments for 1969 Retirees, by State Plan (continued)

48	19.0	6684.	7887.	12152.	55.	29.
49	56.9	4303.	8245.	9719.	14.	38.
50	0.0	1500.	2250.	7879.	19.	13.
51	999.9	99999.	99999.	8154.	-1.	-1.
52	17.6	4875.	6021.	9258.	50.	29.
53	16.8	5064.	6479.	9423.	54.	31.
54	54.0	2175.	4834.	7289.	30.	29.
55	66.1	2016.	3347.	7309.	26.	26.
56	29.8	3159.	5617.	11168.	28.	28.
57	57.2	5343.	8819.	10648.	53.	39.
58	31.0	5084.	8625.	10046.	57.	40.
59	999.9	99999.	99999.	99999.	-1.	-1.
60	17.2	6222.	7947.	10999.	57.	32.
61	17.2	4533.	5790.	9615.	47.	27.
62	43.8	3369.	6289.	8453.	40.	35.
63	12.4	99999.	2814.	8677.	-1.	14.
64	19.6	3312.	4904.	8368.	40.	24.
65	26.8	3241.	4521.	8500.	38.	24.
66	44.7	3355.	5550.	7974.	42.	31.
67	19.4	2725.	4023.	9673.	23.	16.
68	34.0	3875.	5725.	8295.	47.	31.
69	34.0	4303.	6357.	9512.	45.	30.
70	46.0	3297.	7003.	9930.	35.	31.
71	3.6	6425.	8574.	11050.	56.	34.
72	10.4	5724.	8030.	10674.	54.	34.
73	10.4	4093.	4794.	8258.	58.	26.
74	10.3	2974.	4811.	7008.	42.	31.
75	17.2	3190.	4295.	11617.	27.	19.
76	36.3	417.	777.	9254.	5.	4.
77	25.8	7538.	10976.	10833.	70.	45.

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Benefit Adjustments for 1974 Retirees, by State Plan

State Plan	Percent Increase (PERC74)	1974 Benefit (TBENF74)	1980 Benefit (FBENF74)	Final Salary (FSALA74)	1974 Replacement (YREPLA74)	1980 Replacement (ZREPLA74)
1	33.1	4969.	6612.	10821.	46.	30.
2	36.3	4622.	6301.	9955.	46.	33.
3	36.5	10355.	14138.	18048.	57.	47.
4	36.5	11400.	15565.	20184.	56.	46.
5	12.0	5516.	6178.	15137.	36.	24.
6	32.9	3773.	5013.	10105.	37.	29.
7	38.2	3825.	5360.	3744.	46.	37.
8	13.1	9546.	10793.	16963.	56.	38.
9	24.6	10416.	12979.	16934.	62.	46.
10	30.9	7456.	9693.	14053.	53.	41.
11	24.1	8637.	10777.	14054.	62.	46.
12	26.5	7252.	9187.	14680.	49.	37.
13	19.3	5949.	6902.	13541.	44.	29.
14	19.4	7119.	8526.	13807.	52.	37.
15	26.5	5203.	6585.	12450.	45.	34.
16	21.2	3953.	4495.	9976.	39.	29.
17	15.0	8741.	10048.	15490.	56.	39.
18	37.8	5130.	7071.	11605.	44.	36.
19	18.3	8291.	9811.	15993.	52.	37.
20	12.0	4739.	5308.	15283.	31.	21.
21	13.6	4228.	4805.	13538.	31.	21.
22	19.4	3137.	3746.	10750.	29.	21.
23	55.7	2095.	3220.	13731.	15.	14.
24	13.6	2916.	3313.	12433.	23.	16.
25	35.3	6041.	8171.	10525.	57.	46.
26	18.1	4788.	5653.	11281.	42.	30.
27	29.5	7239.	9453.	9913.	73.	67.
28	33.0	8739.	11525.	12516.	70.	55.
29	62.9	8270.	13464.	16106.	51.	50.
30	14.2	11075.	12725.	15687.	71.	61.
31	6.1	6036.	6403.	16065.	38.	24.
32	3.0	6272.	6460.	15763.	40.	24.
33	4.0	5481.	5700.	15617.	35.	22.
34	4.0	4698.	5094.	13450.	35.	22.
35	12.8	4322.	4876.	10326.	43.	29.
36	6.0	6791.	7198.	12633.	53.	34.
37	58.2	3043.	4813.	11473.	27.	25.
38	13.3	4979.	5642.	12167.	41.	28.
39	38.0	5408.	7191.	11490.	47.	37.
40	0.0	1649.	1649.	11914.	14.	9.
41	5.4	1068.	1125.	11025.	10.	7.
42	22.3	9424.	11571.	15401.	61.	45.
43	17.0	5212.	6098.	13028.	40.	28.
44	25.5	7911.	9930.	16807.	47.	35.
45	4.0	5611.	5838.	11243.	50.	31.
46	10.6	4736.	5239.	10711.	44.	29.
47	0.0	8073.	8073.	17672.	46.	27.

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Benefit Adjustments for 1974 Retirees, by State Plan (continued)

48	0.0	9268.	9268.	16409.	56.	34.
49	56.9	4801.	7535.	13124.	37.	34.
50	0.0	3150.	3150.	11186.	28.	17.
51	99.9	99999.	99999.	11011.	-1.	-1.
52	15.4	7261.	8382.	13548.	54.	37.
53	15.5	7187.	8209.	12725.	55.	39.
54	63.6	4005.	6553.	10191.	39.	38.
55	44.8	2545.	3684.	9871.	26.	22.
56	30.4	4259.	5552.	15079.	28.	22.
57	27.0	8337.	10588.	14596.	57.	43.
58	27.0	7653.	9722.	13565.	56.	43.
59	99.9	99999.	99999.	99999.	-1.	-1.
60	12.3	8589.	9413.	14452.	58.	39.
61	12.3	7333.	8235.	12994.	56.	34.
62	26.6	4743.	6004.	11414.	42.	31.
63	12.4	3309.	3722.	11718.	28.	19.
64	20.2	4642.	5819.	11299.	43.	31.
65	5.0	5411.	5682.	10713.	50.	32.
66	34.8	4427.	5067.	10769.	41.	33.
67	23.4	3843.	4741.	12332.	39.	21.
68	27.6	5437.	6939.	11498.	47.	36.
69	27.6	5678.	7247.	12844.	44.	34.
70	21.2	5325.	6470.	13493.	49.	29.
71	3.3	9059.	9354.	15536.	58.	36.
72	19.4	7413.	8852.	14413.	51.	37.
73	1.2	5759.	5800.	10403.	55.	34.
74	8.4	5345.	5795.	9453.	56.	37.
75	12.2	5759.	6452.	15687.	37.	25.
76	42.2	853.	1213.	12495.	7.	5.
77	15.9	10071.	11661.	13991.	72.	50.

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Description of Variables

Variable	Description	Missing Data Codes
Plan	Plan number of the state plan (see Appendix 1 for name of plan)	
PERC69	The percentage increase in pension benefits between 1974 and 1980 for 1969 retirees	999.9
EBENE69	The pension benefit of 1969 retirees at the date of retirement, in dollars	99999
FBENE69	The pension benefit of 1969 retirees in 1980, in dollars	99999
FSALA69	Estimated final salary of 1969 retirees, in dollars	99999
XREPLA69	Pension replacement rate of 1969 retirees at date of retirement, expressed as a percentage	-1
ZREPLA69	Pension replacement rate of 1969 retirees in 1980, expressed as a percentage (1980 pension is converted to retirement date dollars)	-1
PERC74	The percentage increase in pension benefits between 1974 and 1980 for 1974 retirees	99.9
IBENE74	The pension benefit of 1974 retirees at the date of retirement, in dollars	99999
FBENE74	The pension benefit of 1974 retirees in 1980, in dollars	99999
LA74	Estimated final salary of 1974 retirees, in dollars	99999
YREPLA74	Pension replacement rate of 1974 retirees at the date of retirement, expressed as a percentage	-1
ZREPLA74	Pension replacement rate of 1974 retirees in 1980, expressed as a percentage (1980 pension is converted to retirement date dollars)	-1

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APPENDIX 6

SURVEY INSTRUMENT*

STATE AND LOCAL
COST OF LIVING ADJUSTMENT
QUESTIONNAIRE

I am at the Heller Graduate School at Brandeis University doing a study relating to cost of living adjustments in state and local as well as teacher plans. I need to obtain some information about your plan.

1. a) Have there been any automatic or ad hoc cost of living adjustments made by this plan since 1975 for people already retired?
(obtain the year, type, and amount of each)

b) Are there any provisions in the plan for a decrease in the cost of living adjustment (pension) if the Consumer Price Index were to fall?

____ Yes
____ No

2. Is the cost of living adjustment dependent upon:

____ Yes
____ No changes in the Consumer Price Index or some other price index?

____ Yes
____ No legislative acts?

____ Yes
____ No performance of the pension plan's investment portfolio?

____ Yes
____ No recommendations of a pension commission or other body?

____ Yes
____ No other? specify: _____

3. Are there any restrictions or limits placed upon cost of living adjustments?

____ Yes
____ No an age restriction before being eligible to receive (age = _____)

____ Yes
____ No a deferred waiting period (time period = _____, # of months)

____ Yes
____ No increases are based upon only a portion of the benefit, for example, the first $5,000 of a benefit (amount = $_____)

*This instrument was used as a guide for the telephone interviewer. Questions were not always asked exactly as they appear on the instrument.

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4. Are the cost of living adjustments always applied to the individual's original base benefit as calculated at the time of his retirement, or are they compounded?

____ applied to the base benefit only
____ compounded, calculated on each cost of living adjustment as well

5. Have there been any changes in the formula used to calculate retirement benefits since 1975?

____ Yes specify formula in 1974: _____
____ No

6. Have intended cost of living adjustments always been in fact implemented? for example, has funding always been sufficient to cover the intended cost of living adjustments?

____ Yes
____ No

7. How have the cost of living adjustments been funded? (note: this question was deleted from the survey)

8. Can you tell me:

_____ how many active members are in this plan?
_____ how many retired members are in this plan?
____ the approximate age at which most employees retire?
____ if there is a separate plan for teachers?

9. Can you send a copy of your plan provisions and the most recent annual report?

____ Yes
____ No

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